

WHAT IS CLAIMED IS:

1. An optical system for enlarging a field of view with respect to an object by high-speed scanning, image capture, and image mosaicking along an optical path, comprising:

an objective lens or lens assembly positioned downstream from the object along the optical path so that the object is positioned at a focal plane of the objective lens or lens assembly;

an iris downstream from the objective lens or lens assembly along the optical path;

one or more scanning mirrors placed downstream from the iris along the optical path for optical high-speed scanning;

one or more imaging lenses downstream of the scanning mirrors along the optical path;

a high-speed digital imaging device downstream of the imaging lenses along the optical path; and

means for processing and constructing scanned and captured images into a mosaic image.

2. An optical system according to claim 1, further comprising a laser in the optical path between the scanning mirrors and imaging lenses.

3. An optical system according to claim 1, wherein the system has a refresh rate in the range of 0 Hz to 25 Hz.

4. An optical system according to claim 1, wherein the objective lens is an achromat with a focal length of about 50mm, and a diameter of about 25.4mm.

5. An optical system according to claim 1, wherein the

imaging lenses are a converging lens with a focal length of about 50mm, and a diverging lens downstream of the converging lens along the optical path with a focal length of about 9mm.

6. An optical system according to claim 5, wherein the converging lens has a diameter of about 25.4mm, and the diverging lens has a diameter of about 9mm.

7. An optical system according to claim 1, wherein the high-speed digital imaging device is a CCD or CMOS camera.

8. An optical system according to claim 1, wherein the mosaic image is 4 x 4, with an image area of each dimension being 2mm x 1.5mm and an overall field of view being 8mm x 6mm at a resolution of 320 x 240.

9. An optical system according to claim 1, wherein the system completes a mosaic image in 40ms.

10. An optical system according to claim 1, wherein the one or more imaging lenses are combined with an iris.

11. An optical system according to claim 1, further comprising an illumination system upstream of the object.

12. An optical system for enlarging a field of view with respect to an object by high-speed scanning, image capture, and image mosaicking along an optical path, comprising:

an objective lens assembly positioned downstream from the object along the optical path so that the object is

positioned at a focal plane of the objective lens assembly;
an iris downstream from the objective lens assembly
along the optical path;

one or more galvanometric scanning mirrors placed
downstream from the iris along the optical path for optical
high-speed scanning;

one or more imaging lenses downstream of the
galvanometric scanning mirrors along the optical path;

a high-speed digital imaging device downstream of the
imaging lenses along the optical path; and

means for executing a dedicated algorithm for
processing and constructing scanned and captured images into
a mosaic image.

13. An optical system according to claim 12, wherein
the objective lens is an achromat lens.

14. An optical system according to claim 12, wherein
the system has a refresh rate of 25 Hz.

15. An optical system according to claim 12, wherein
the high-speed digital imaging device is a CCD or CMOS
camera.

16. An optical system according to claim 12, wherein
the mosaic image is 4 x 4, with an image area of each
dimension being 2mm x 1.5mm and an overall field of view
being 8mm x 6mm at a resolution of 320 x 240.

17. An optical system according to claim 12, wherein
the means for executing a dedicated algorithm is a computer.

18. An optical system according to claim 12, wherein the one or more imaging lenses are combined with an iris.

19. An optical system according to claim 12, further comprising an illumination system upstream of the object.

20. A method for enlarging a field of view with respect to an object along an optical path, comprising the steps of:

placing an object at a focal plane of an objective lens so that rays reflecting off the object are collimated at scanning mirrors placed downstream from the objective lens along the optical path;

acquiring images of different segments of the object by scanning the reflected rays with the scanning mirrors at a high speed;

forming an image onto a digital imaging device from the images acquired by the scanning mirrors; and

constructing a mosaic image from images captured by the digital imaging device.

21. The method according to claim 20, wherein the method achieves a refresh rate of 25 Hz.

22. The method according to claim 20, wherein the method for producing the mosaic image is achieved in 40ms.

23. The method according to claim 20, wherein the high-speed digital imaging device is a CCD or CMOS camera.

24. The method according to claim 20, wherein the constructed mosaic image is 4 x 4, with an image area of

each dimension being 2mm x 1.5mm and an overall field of view being 8mm x 6mm at a resolution of 320 x 240.